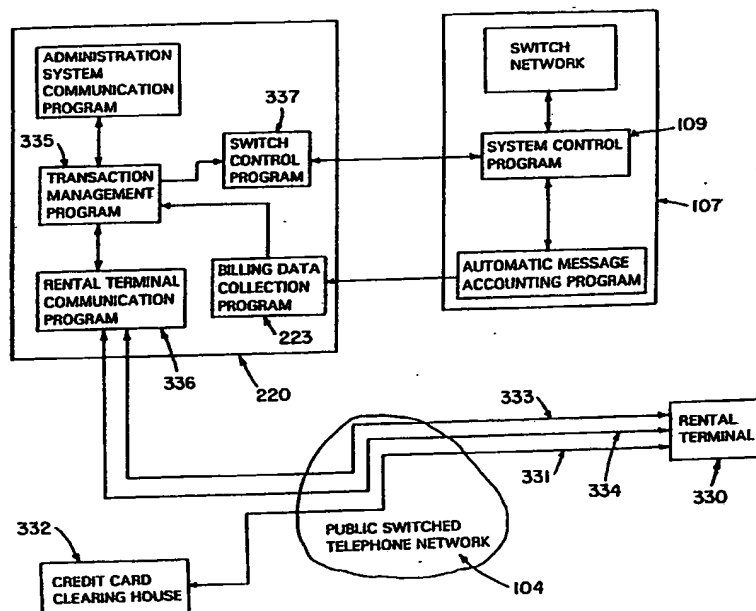




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**(54) Title: REAL TIME CELLULAR PHONE RENTAL SYSTEM AND METHOD**



**(57) Abstract**

Cellular telephone rental system and method wherein a point-of-purchase rental terminal (330) capturing transaction data, obtains validation thereof, and communicates same to a collector (220) which in turn instructs a switching system (108) to enable the cellular phone (101) to make and receive calls. The collector (220) examines in real time automatic message accounting data (110) in the switching system (108) and calculates call charges in real time. The collector (220) then transmits call data to the rental terminal (330) which provides both rental agency and the cellular phone (101) user call data in real time, with the call data also being transmitted to an account administration system nightly (440).

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## REAL TIME CELLULAR PHONE RENTAL SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATION

5        This application is a continuation of U.S. patent application 07/527,136, entitled Real Time Cellular Phone Rental System And Method, and filed May 22, 1990.

BACKGROUND OF THE INVENTION10        Field of the Invention

Cellular telephone rental system under control of a collector system controlling call placement, call detail and providing real time data collection and billing.

Description of the Prior Art

15        The business of renting cellular phones has been fraught with bad debt and cash flow problems. These problems have been so severe that they have limited profit margins for some cellular phone rental companies and forced others out of business entirely even though the demand for such service has  
20 remained high.

There are two primary reasons for the difficulties in renting cellular telephones. Firstly, the cellular phone rental companies must deal with a cash flow problem which is beyond their control. Presently, cellular telephone service  
25 carriers cannot provide call detail and toll billing to the rental companies on a more frequent basis than once per month. The data are generally provided on paper and sometimes magnetic tape. Either way, the rental company must manually sort and order the tendered data into rental  
30 transactions in order to bill customers. At best, a rental company receives revenue from customers one month after the service was first provided. Secondly, the rental company has no direct control over when a phone is operable and when it is not. This means that a phone sitting in inventory, ready  
35 to be rented, may be used fraudulently by a thief or anyone else who may have access to the phone.

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Several systems have focused on solving the second problem, control of a cellular phone's operability. Their solution to the problem is that of integrating a credit card reader and a processor into the cellular phone for validating  
5 a prospective customer's credit worthiness.

Examples of such systems are described in Harris U.S. Patent No. 4,777,646 and D'Avello U.S. Patent No. 4,831,647. While these systems are effective in eliminating fraudulent use, they are expensive and require a rental company to use  
10 one vendor's special phones exclusively. In addition, they offer little help in solving the major problem of cash flow.

#### Summary of the Invention

The present invention eliminates the problems normally  
15 associated with the rental of cellular phones.

Specifically, it provides for the collection of billing information directly from the cellular telephone switch in real time so that charges may be billed directly to an authorized credit card.

20 In addition it provides a mechanism for controlling a standard cellular phone's ability to make calls on demand by issuing appropriate commands to the systems cellular telephone switch, thereby eliminating potential fraud.

These and other features and advantages of the  
25 invention will be evident from the following description of certain preferred embodiments of the invention.

#### Brief Description of the Drawings

FIG. 1 is a schematic diagram of a conventional  
30 cellular telephone system.

FIG. 2 is a schematic diagram of a cellular phone system according to the present invention, including a collector system and interface to the cellular telephone switch.

35 FIG. 3 is a schematic diagram of a cellular telephone rental transaction process according to the invention.

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FIG. 4 is a schematic diagram of a system for administering a cellular phone rental operation according to the invention.

FIG. 5 is a schematic diagram showing wide area rental system including a plurality of collector systems as diagrammed in FIG. 1 and a plurality of administration systems as diagrammed in FIG. 4.

#### Description of the Preferred Embodiments

10       The Federal Communications Commission (FCC), which controls and regulates the cellular communication industry, is responsible for granting licenses required to operate cellular phone systems. The FCC has divided the country into a number of geographical areas. To encourage competition FCC  
15 regulations require that there be two cellular telephone carriers in each geographical area. The FCC has further specified that one carrier must be a wire line, or standard phone service provider, and the other must be a non-wireline provider.

20       Cellular carriers provide a cellular system for each geographical area licensed. The cellular system serves to interconnect a cellular telephone subscriber with other cellular subscribers or with standard telephones.

FIG. 1 schematically illustrates a typical  
25 conventional cellular system installed and maintained by a cellular carrier. There are three major parts to such a cellular telephone system: Cellular Subscriber Stations 101; Cellular Base Stations (or cell sites) 102; and a Mobile Telephone Switching Office (MTSO) 103.

30       The Subscriber Stations 101 are standard portable or mobile telephones, each consisting of a standard transceiver, handset and antenna.

Cellular Base Stations 102 are arranged adjacent areas called cells. The base stations are responsible for setting  
35 up and maintaining calls placed to and from subscriber stations in their respective cells, "handing off" calls to

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neighboring cell sites as subscribers move and communicating call progress with the MTSO 103 through network connection 106.

The MTSO consists of a telephone Switching System 107 with network connections to Cellular Base Stations 106 and trunk lines 105 to and from the Public Switched Telephone Network (PSTN) 104. Examples of known cellular telephone switches are the Autoplex 1000 from AT&T and the Motorola 2500. It is the function of the MTSO to maintain a database of subscribers and subscriber features, track the progress of calls made to or from subscribers, and record call detail for billing purposes.

The telephone Switching System 107 is a computer which has three general programs: a switch network program 108, system control program 109 and an automatic message accounting program 110.

The switch network management program 108 manages the interconnection of subscriber stations 101 and the PSTN 104.

The system control program 109 provides functions to maintain the database of subscriber stations 101. Access to the maintenance functions is provided through asynchronous terminal connections 111 in a known manner.

The automatic message accounting program 110 delivers the call detail for billing purposes. The method of delivery for the call detail varies from switch to switch. Some switches 103 only provide the data by storing it on magnetic tape drives 114. Others provide a synchronous connection 113 utilizing some layers of the CCITT X.25 protocol in addition to magnetic tape drives 114. Still others provide asynchronous ASCII connections 112.

#### Real Time Monitoring and Control

The primary feature of this invention is that it enables the real time collection of data from the cellular switch 107 and real time control of the database of subscriber stations 101. The real time operations are

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accomplished through the use of a multi-processor computer system co-located at the cellular MTSO 103. This system can be suitably referred to as the Collector System 220.

The Collector System 220 (sometimes herein referred to simply as the Collector) is comprised of computer hardware and communications devices under the control of specialized programs. The Collector's programs function to process rental transactions, collect and cost billing data, and to activate/deactivate phones via direct switch control; all in real time.

Real time control of subscriber stations is achieved by connecting an asynchronous ASCII port controlled by the Collector's switch control program 222 to an asynchronous ASCII port provided on the cellular switch 107 and controlled by the switch's system control program 109. With this connection, the Collector 220 can query subscriber station status and issue commands directly to the cellular switch 107.

Real time data collection is accomplished by establishing a direct connection between the switch's automatic message accounting program 110 and the Collector's billing data collection program 223, utilizing interprogram computed communication techniques in a manner known per se. This connection is made to either an asynchronous ASCII port 112 or an X.25 connection 113 depending on what a particular switch manufacturer may provide.

On switches where the manufacturer has no provision for real time data collection, a direct interface to the magnetic tape drives 114, where call data are logged is required. In this case, real time data collection is accomplished through the installation of passive tape taps 224 installed between the switch's automatic message accounting program 110 and the switch's tape drives 114.

The Collector's billing data collection program is responsible for receiving the switch Automated Message Accounting (AMA) data from the switch, filtering out

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pertinent billable calls, calculating toll, and forming the data into billable call records ordered by rental transactions. The billable call records are stored and made available for immediate recall on the Collector in a non-volatile fashion, and for long duration (usually up to one year).

### Rental Transactions

Rental phones (stations 101) are standard portable or mobile telephones. From the perspective of the cellular switch, they are no different than any other subscriber station. The Collector 220 maintains a list of all rental phones currently in service, and when calls are placed to or from any rental phone, the call detail is captured by the billing data collection program 323 and stored in a database by the transaction processing program 335.

Rental agents activate service to real time rental phones using a small point-of-purchase device called a Credit Card Terminal or Rental Terminal 330, such as known in the industry as a VeriFone terminal, namely the Tranz 330 marketed by VeriFone, Inc. of Miliani, Hawaii. According to the present invention, this terminal is programmed to make two phone calls. The first call, shown schematically at 331, is to a credit card clearing house 332 that checks the status of the customer's credit card account. If the credit is approved, the terminal 330 places a second call, shown schematically as 333, to the Collector 220. The Collector 220 then processes the rental transaction and activates service to the phone by a "check-out" procedure.

The "check-out" transaction from the rental terminal 330 is handled by a special communication program in the Collector called the rental terminal communication program 336. This program captures the phone rental transaction data (credit card number, phone number, date, time etc.) and passes such to the transaction management program 335 where it is stored in the transaction database. The transaction

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management program 335 then issues an "activate phone" order to the switch control program 337 which in turn issues appropriate commands to the system control program 109 on the switch 107 to enable service to the rental phone. Rental  
5 phones are not able to make or receive calls until they have been activated on the switch 107 via the Collector 220.

When a customer returns the rental phone, the rental terminal 330 is used to close the transaction and deactivate the phone on the switch 107 via the Collector 220. This is  
10 accomplished again through a phone call from the rental terminal 330, shown schematically at 333, to the Collector 220. The Collector 220 again processes the transaction and disables service to the phone by a "check-in" procedure.

The "check-in" transaction from the rental terminal  
15 330 is handled by the Collector's rental terminal communication program 336 using a protocol similar to the "check-out" transaction. In the case of "check-in", however, a "deactivate phone" order is issued to the switch.

Upon completion of the check-in, the transaction  
20 management program 335 sends a transaction receipt to the terminal communication program 336 which in turn transmits it to the rental terminal 330 where it is printed for the customer's reference.

## 25        Rental Administration

The Rental Administration System 440 consists of standard computer hardware, including a computer, terminals, printers and modems for communication with the Collector 220. A known example of such a system is the MIServer marketed by  
30 Pyramid Technologies.

The Rental Administration System 440 receives information from and transmits information to the Collector 220 over standard telephone lines connected to the PSTN 104. A specialized program, the administration system  
35 communication program 441, in the Collector 220 serves to provide secure and reliable bi-directional communication with

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the Rental Administration System 440. The administration system communication program 441 utilizes the transaction management program 335 on the collector to query for or make modifications to transaction data on behalf of a given rental administration system 440.

With the information received from the Collector 220 the Rental Administration System 440 can bill customers directly to their credit card accounts and provide information about their rental phone usage. The Rental Administration System also tracks phone inventory, stores customer information, and prints a variety of management reports.

Typically, the Rental Administration System 440 has four major groups of programs: Phone Inventory Management, Customer Service, Billing, and Management Reporting.

Phone Inventory Management includes:

- Add new phones to the rental phone inventory.
- Transfer phones to a different rental station.
- 20 Assign a new mobile number to a phone so it can be transferred to a rental station in another city.
- Assign a new car number to an installed phone so it can be transferred to a different vehicle.
- Record changes in a phone's status if a phone is out for repairs or reported missing.
- 25 Remove a phone from inventory.

Customer Service includes:

- Manual check-out or check-in of a phone when a problem at a rental station prevents a rental terminal check-in or check-out.
- Review a rental transaction.
- Request, print and review a detailed list of calls for customers who request a call-by-call account of the rental phone usage.
- 35 Record comments about special or problem customers.

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## Billing includes:

- Edit report prior to drafts printing or electronic submission.
- Printed sales drafts.
- 5 Electronic draft submission.
- Draft register.
- Credit drafts.

## Management Reporting includes:

- 10 Rental station activity report.
- Daily operations summary.
- Agent point total report.

## Real Time Phone Rental

- 15 The Real Time Phone Rental system can be readily utilized as a wide area or even nationwide network consisting of a multiplicity of Collector Systems 220 and Rental Administration Systems 440.

One Collector System 503 (like Collector 220) is  
20 required for each of the geographical areas 501, 502. This means that a given collector system may be connected to several switches 504, 505 since multiple switches are required to handle the call traffic in more populated areas, although in most carrier geographical areas a single  
25 collector is connected to a single switch.

A Collector 503 can communicate with a multiplicity of rental administration systems 506, 507. Therefore multiple cellular rental vendors (e.g. car rental agencies) can operate simultaneously in a given metropolitan area.

- 30 Conversely a given rental administration system 506 may communicate with a multiplicity of Collector Systems 503, 509. This allows a cellular phone rental vendor to operate in any city where a carrier has a collector system operating.

- 35 From the foregoing various modifications and other applications of the invention will be apparent to those

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skilled in the art to which the invention is addressed,  
within the scope of protection afforded by the following  
claims.

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## WHAT IS CLAIMED IS:

1. The method of mobile telephone subscriber rental call processing which utilizes a cellular telephone switching system, a collector, an administration system and a  
5 point-of-purchase rental terminal to track the rental activity of a cellular telephone and bill charges directly to a user's credit card account, comprising the steps of:
  - capturing in the point-of-purchase rental terminal  
10 phone rental transaction data including credit card number, credit card expiration, rental phone number, and data and time of the transaction;
  - initiating a validation inquiry from the  
point-of-purchase rental terminal to a credit card clearing  
house as to the status of the user's credit card account and  
15 receiving at the rental terminal the response from the credit card clearing house;
  - communicating the validation response to the  
collector from the point-of-purchase rental terminal;
  - issuing commands from the collector to the switching  
20 system enabling the rental cellular telephone to make calls at the inception of a rental transaction;
  - examining in real time in the collector the call data generated by the rental cellular phone by examining automatic message accounting data in the cellular telephone switching  
25 system;
  - calculating in the collector the toll and air charges for the captured call data;
  - disabling the rental cellular phone's ability to make calls upon termination of the rental transaction by the  
30 collector issuing commands directly to the cellular telephone switching system;
  - storing in the collector the rental transaction charges and associated detailed call records, from which the collector transmits call data to the point-of-purchase rental  
35 terminal upon termination of the rental transaction and the

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rental terminal generates for the user a written summary of the rental transaction; and

billing through the administration system the rental transaction charges directly to the user's credit card account.

2. In a cellular telephone rental system including a plurality of mobile telephone subscriber stations, each associated with a point-of-purchase rental terminal, a plurality of cellular phones, a cellular telephone switching system including a plurality of trunk circuits to the public switched telephone network, a collector, and an administration system, the improvements by which the rental activity of the mobile telephones is tracked in real time and billed directly to a user's credit card account and a written summary of the rental transaction is generated in real time at the rental terminal, said system comprising:

means in the point-of-purchase rental terminal for capturing phone rental transaction data including the user's credit card number, credit card expiration date, rental phone number, and date and time of the transaction;

means in the rental terminal initiating a validation inquiry to a credit card clearing house and receiving the response therefrom;

means in the rental terminal communicating the validation response to the collector;

means in the collector responsive to the validation response issuing commands directly to the cellular telephone switching system enabling the user's cellular phone to make calls at the inception of a rental transaction;

means in the collector capturing in real time the call data generated by the cellular telephone by examining automatic message accounting data in the cellular telephone switching system;

means in the collector calculating the toll and air charges for the captured call data;

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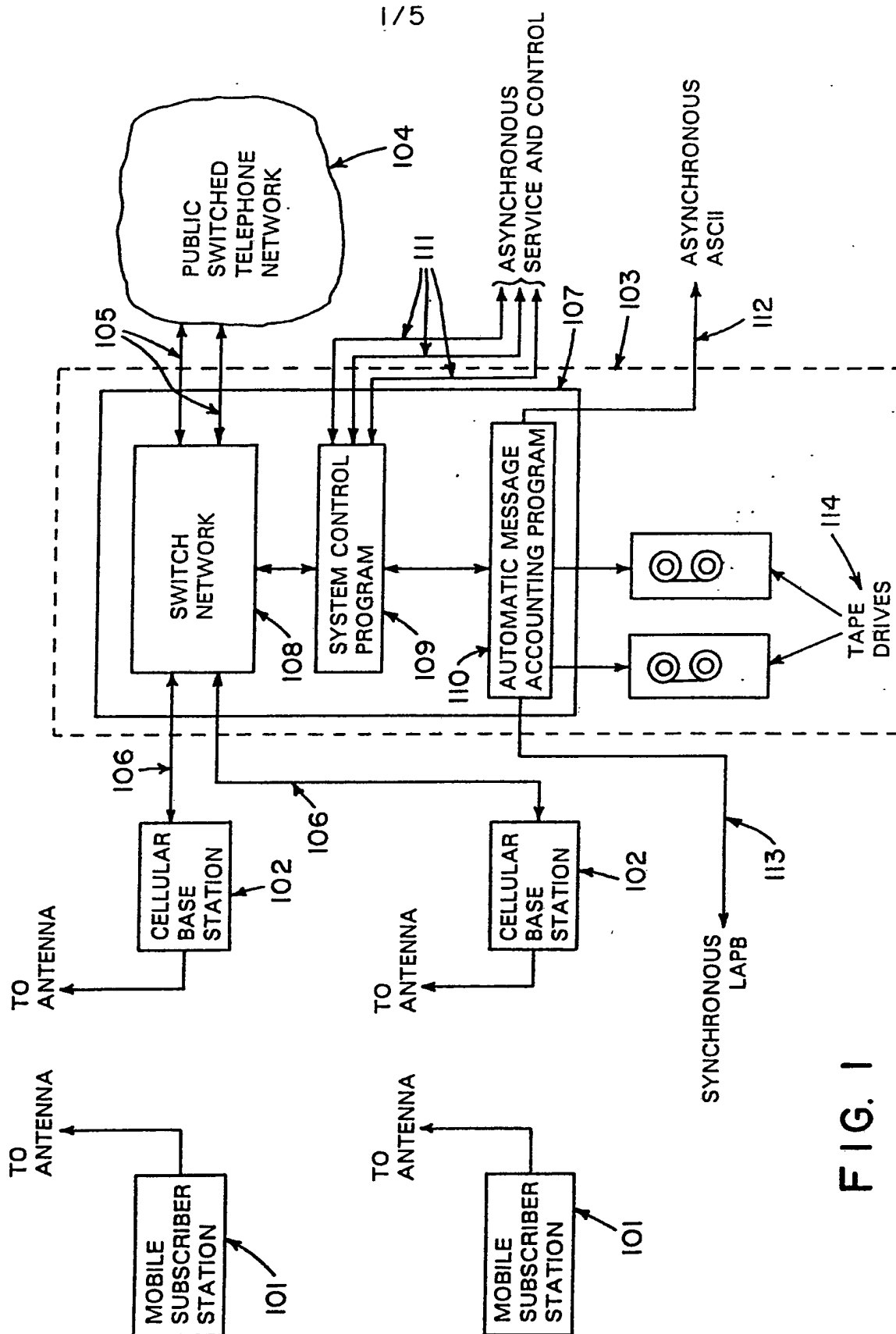
means in the collector responsive to a communication from the point-of-purchase rental terminal for issuing a command directly to the cellular telephone switching system to disable the the user's cellular phone upon termination of  
5 the rental transaction;

means in the collector storing the rental transaction charges and associated detailed call records and transmitting summary call data to the point-of-purchase rental terminal upon termination of the rental transaction; and

10 means in the administration system by which the rental transaction charges are billed directly to the user's credit card account.

3. A communications system according to claim 2,  
15 comprising a plurality of said rental administration systems in communication with said collector system.

4. A communication system in accordance with claim 2,  
wherein said rental administration system is in communication  
20 with a plurality of collector systems.



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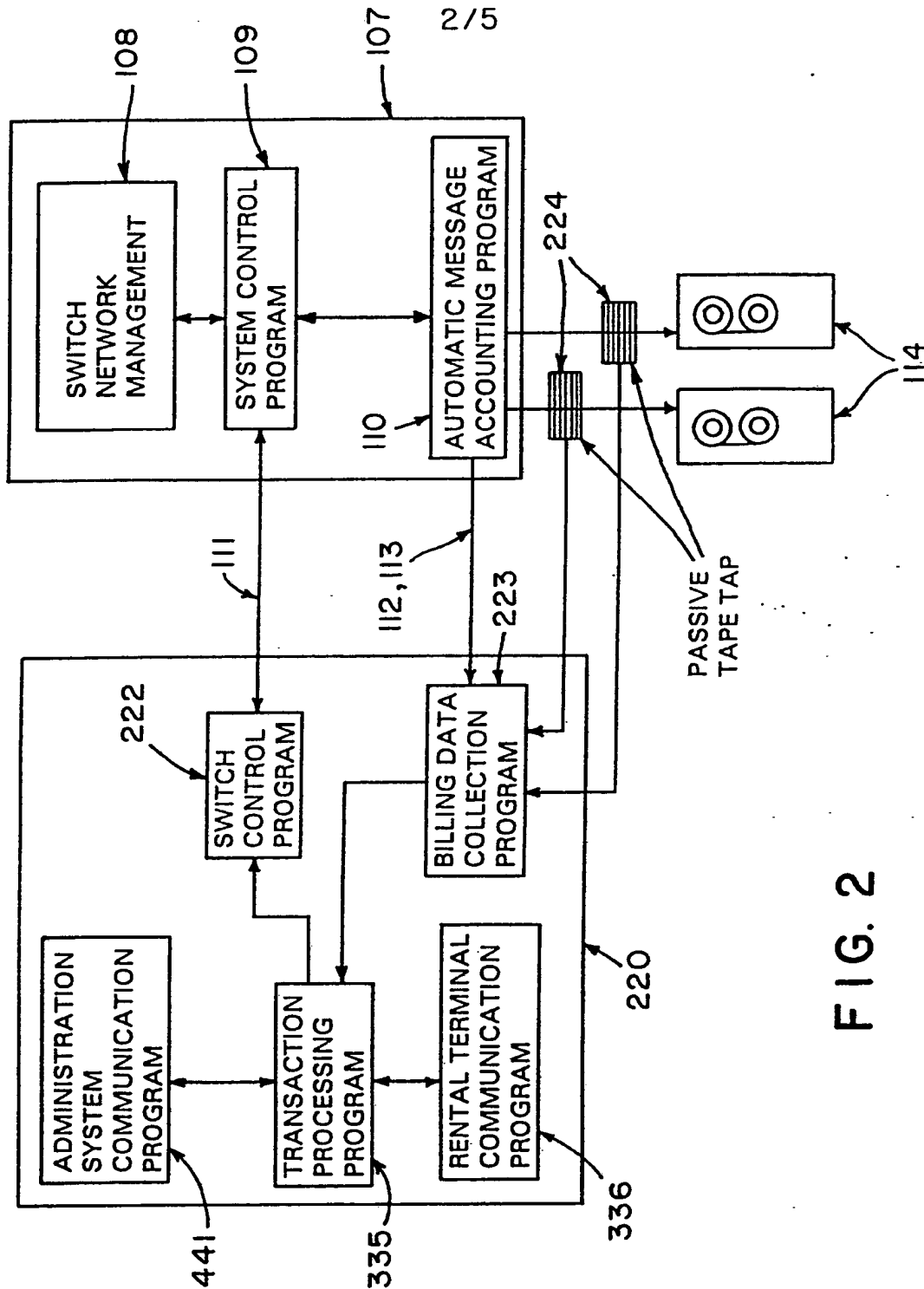


FIG. 2

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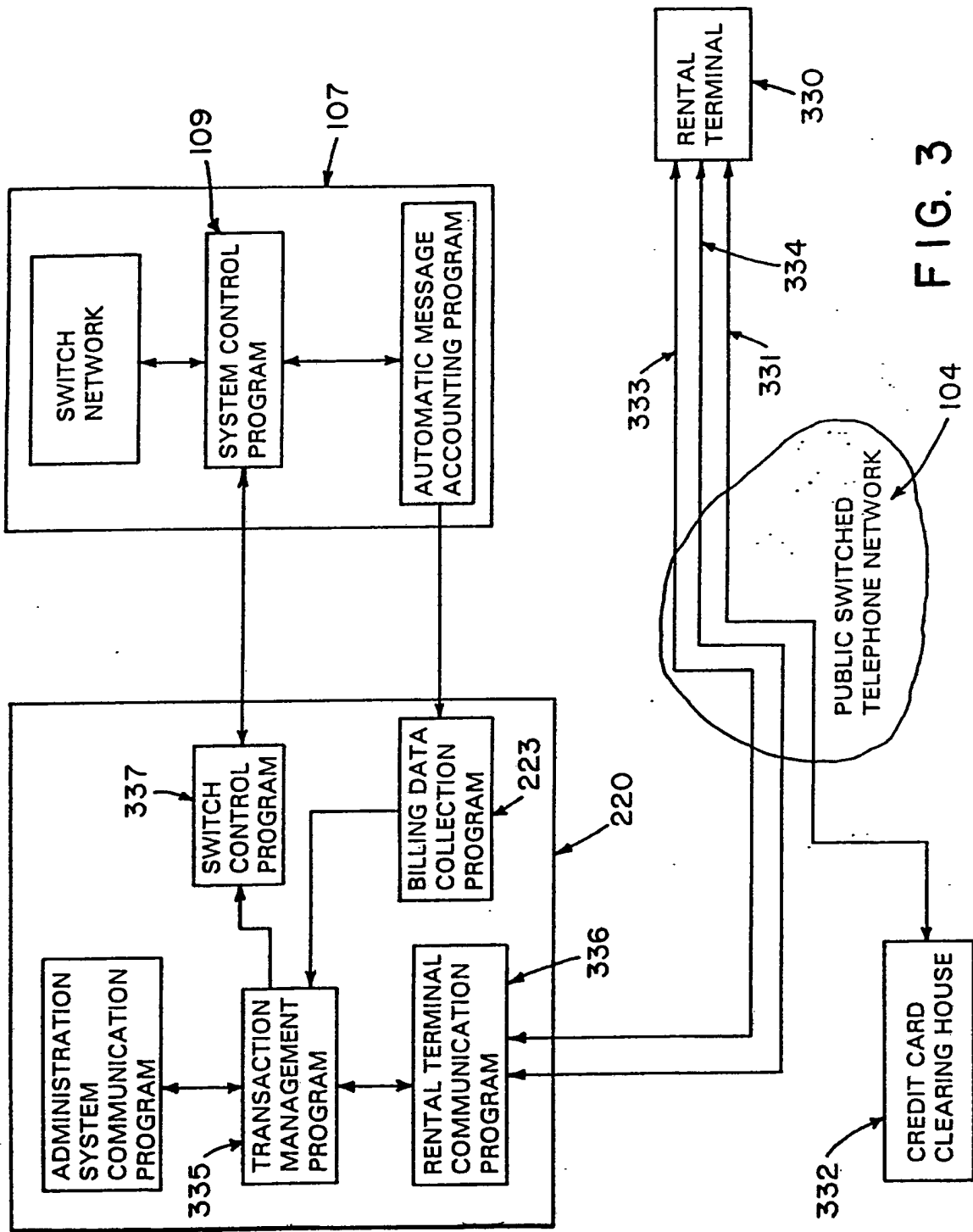
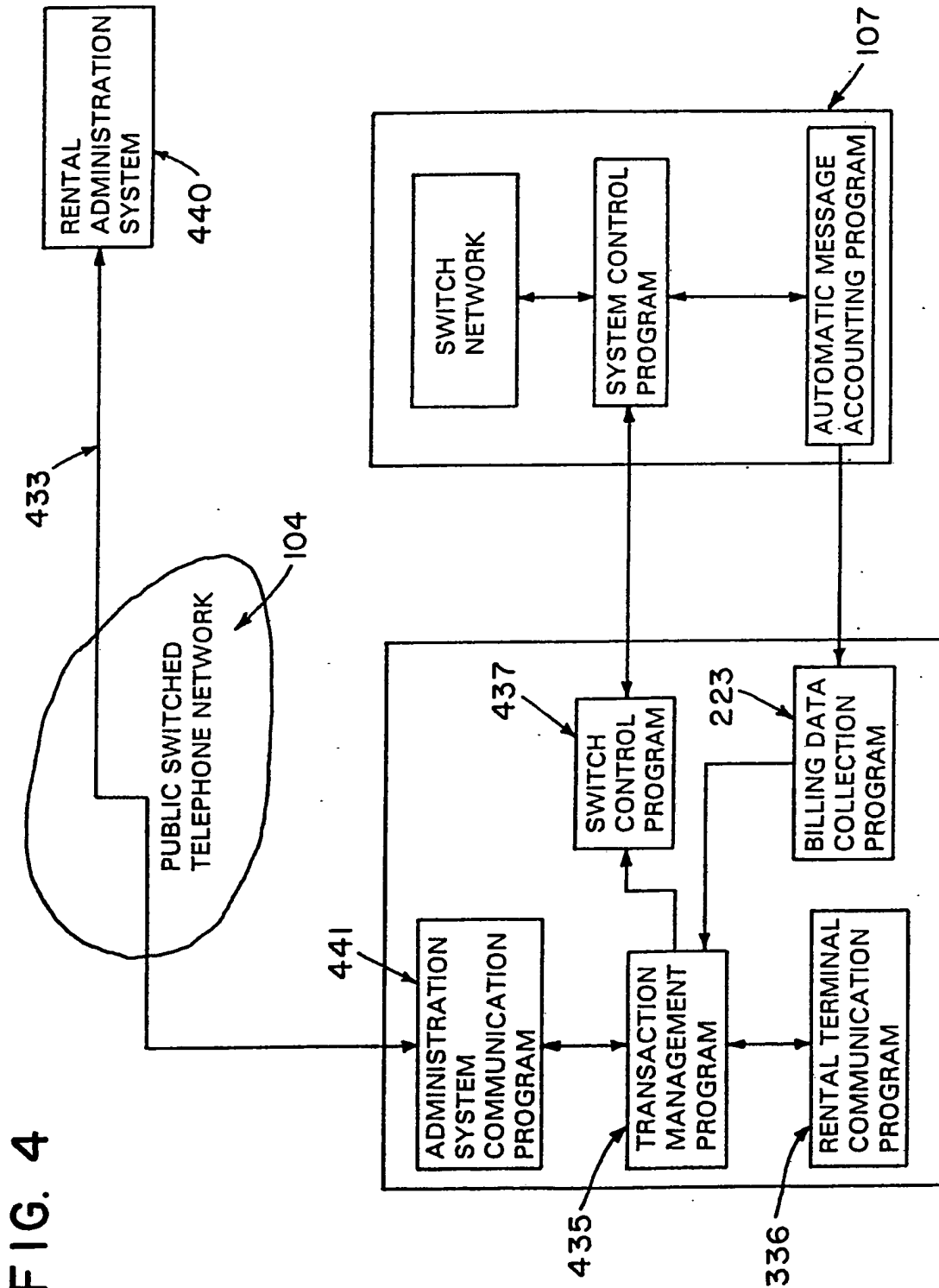


FIG. 3

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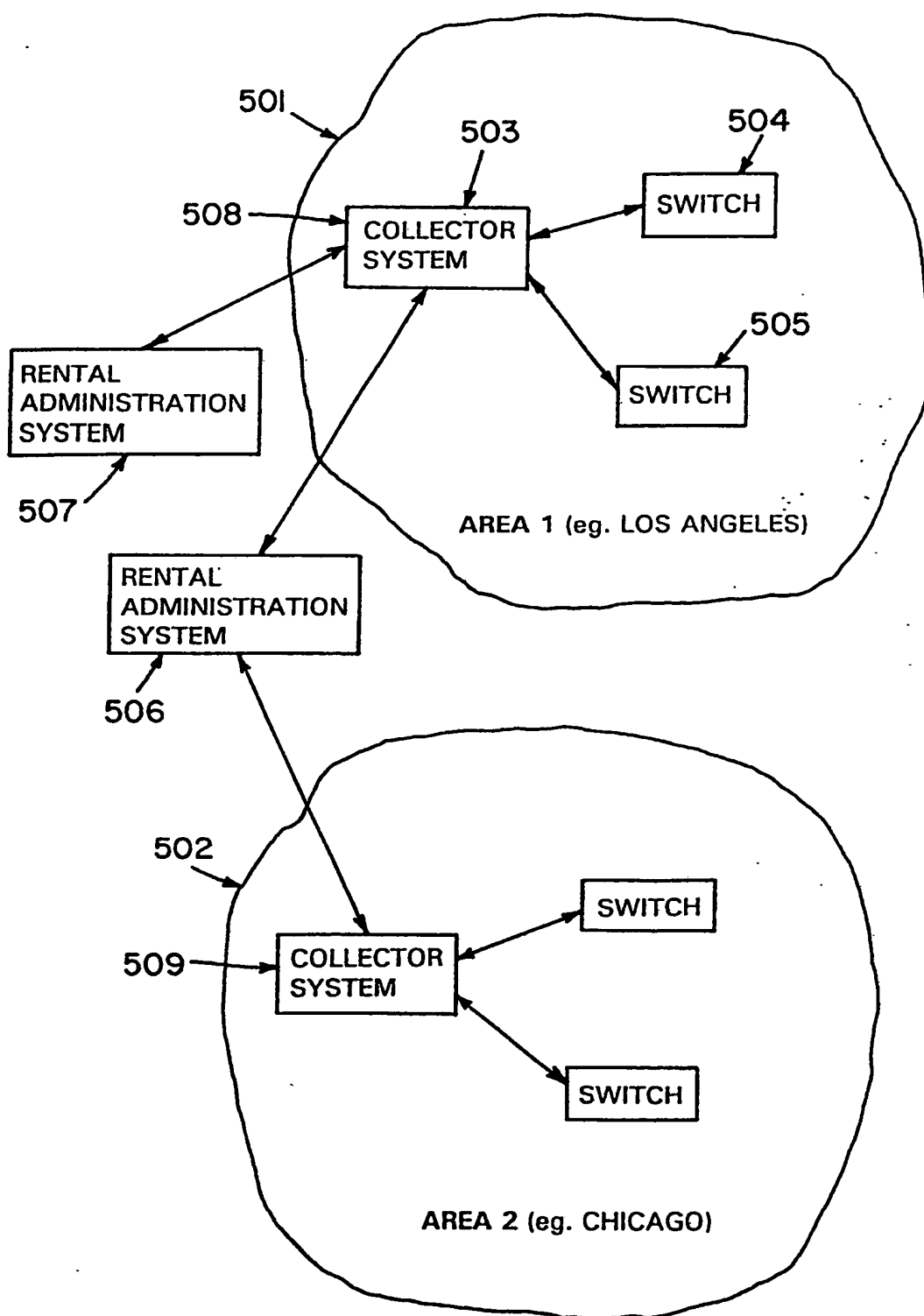


FIG. 5

# INTERNATIONAL SEARCH REPORT

International Application No PCT/US91/03583

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>1</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC (5): HO4M 11/00		
US Cl.: 379/59		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>2</sup>		
Classification System	Classification Symbols	
US	379/56,58,60,62,91,112,114,130,144	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>3</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>4</sup>		
Category <sup>5</sup>	Citation of Document, <sup>6</sup> with indication, where appropriate, of the relevant passages <sup>7</sup>	Relevant to Claim No. <sup>8</sup>
Y	US, A, 3,725,947 (Albertini et al) 03 April 1973 Figures 2 and 5	1-4
A	US, A, 4,640,986 (Votsutani et al) 03 February 1987	1-4
A	US, A, 4,776,000 (Parienti) 04 October 1988	1-4
Y	US, A, 4,776,003 (Harris) 04 October 1988 Figure 2; column 2, lines 55-65; column 3, lines 41-65; column 4, line 62 to column 5, line 54; column 6, lines 25-45	1-4
A	US, A, 4,831,647 (D'Avello et al) 16 May 1989	1-4
A,P	US, A, 4,951,308 (Bishop et al) 21 August 1990	1-4
A,P	US, A, 4,958,368 (Parker) 18 September 1990	1-4
<p><sup>9</sup> Special categories of cited documents: <sup>10</sup></p> <p>-A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>-E" earlier document but published on or after the international filing date</p> <p>-L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>-O" document referring to an oral disclosure, use, exhibition or other means</p> <p>-P" document published prior to the international filing date but later than the priority date claimed</p> <p>-T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>-X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>-Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>-&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <sup>11</sup>		Date of Mailing of this International Search Report <sup>12</sup>
11 July 1991		13 AUG 1991
International Searching Authority <sup>13</sup>		Signature of Authorized Officer <sup>14</sup>
ISA/US		William Cumming

**FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET**

Y,P	US, A, 4,975,942 (Zebryk) 04 December 1990 Column 1, line 57 to column 2, line 28; column 5, lines 32-66, column 4, lines 3-8	1-4
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**V ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE<sup>1</sup>**

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers \_\_\_\_\_ because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claim numbers \_\_\_\_\_ because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out. Specifically:
  
3. ☐ Claim numbers \_\_\_\_\_ because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

**VI ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING<sup>2</sup>**

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims: \_\_\_\_\_
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report covers only the invention first mentioned in the claims; it is covered by claim numbers: \_\_\_\_\_
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority does not invite payment of any additional fee.

**Remark on Protest**

- ☐ The additional search fees were accompanied by applicant's protest.  
☐ No protest accompanied the payment of additional search fees.